

# CLEARWAVE™ WATER CONDITIONER

## MODEL CW-HD-2

The ClearWave™ is the most advanced hi-tech computerized anti-scale device available today. It operates by using a programmed 'chip' to constantly cycle through and induce over 200 different electro-magnetic low frequency wave pulses into the water. These wave pulses produce water with remarkable anti-scale properties, without adding salts or chemicals, at an operating cost for electricity of approximately \$25.00 per year.

**POWER SPECIFICATIONS:** 18 VAC, 25 Watts, .22 Amps

### HOW IT WORKS

Pure water contains nothing but H<sub>2</sub>O. But water, as it comes out of the ground, is rich in a multitude of minerals. Minerals such as calcium and magnesium are the main components of hard water, and the cause of scale formation and other problems.

***There are three basic methods used to control the problem of hardness and specifically scale formation.***

#### **ION EXCHANGE:**

One method is to remove the calcium and magnesium from the water through ion exchange (the traditional water softener). This method requires the use of a resin filled tank with a high concentration of salt ions. As the water flows through the resin tank the salt ions (typically sodium) are exchanged for the calcium or magnesium ions. This lowers the concentration of the minerals that cause scale and therefore inhibits scale formation.

#### **CHEMICAL ADDITION:**

A second method used to control hard water scale is the addition of chemicals (such as phosphates) to the water. These materials chemically alter the scaling characteristics of the calcium or magnesium, allowing the concentration of the minerals to stay the same while still reducing scale formation and its affects.

Both of the above methods require the use of consumable materials to change the makeup of the water. For these devices to function properly, the homeowner must continuously replenish the salts or chemicals as well as perform periodic maintenance on the equipment. In addition to these inconveniences, the chemicals and salts discharged into the effluent water present problems downstream to the municipal water treatment facility and the environment. Many U.S. cities have been enacting and/or evaluating environmental legislation to limit or reduce the levels of chemicals or salts that result from these types of water treatment methods.

#### **ELECTRIC POTENTIAL:**

A third method used to treat the hard water problems associated with scale utilizes changes in electrical potential in the water to produce the affects of chemical addition. The electric potential applied changes the scaling characteristics of the calcium or magnesium without the removal of these ions or the addition of chemicals.



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## *Magnets*

Bar magnets were the first types of equipment used to generate electric potential changes in water. Bar magnets have been used with limited success to inhibit scale formation. The fixed magnetic field of a bar magnet creates electric potential changes in the water only when the water moves through the magnetic field. Electromagnets function in much the same way as bar magnets, but the magnetic field is created by passing a current through a coil, essentially creating a more powerful fixed magnetic field. Inherently, fixed magnetic fields are limited to a narrow range of applications, pipe sizes and water flow rates.

Permanent bar magnets and electromagnets have been promoted as a method of “treating” hard water, but they do not treat the vast and complex array of mineral contents and concentrations found in water. Particles can also build up inside the pipe where the magnet is placed, eventually causing blockage at the very point it is supposed to be doing its job.

## *Electrostatic Devices*

Electrostatic devices create an electric potential in the water between two electrodes. One electrode is mounted in the water stream in the center of the pipe housing, while the pipe itself acts as the other electrode. The device applies a voltage across the two electrodes to create the electric potential in the water. This electrostatic approach was an improvement upon the bar magnets and electromagnets, but increased the initial cost considerably while not dramatically improving the range of effective conditions.

## *ClearWave™*

The ClearWave™ water conditioning system operates on similar principles as the magnets and electrostatic devices. But unlike those previously mentioned, the ClearWave™ uses microprocessor technology to electronically generate inaudible wave-forms which help keep calcium carbonate particles (scale) dissolved or suspended in water. With ClearWave™, the electric field generated is always being applied to the water, while a magnetic field relies on the movement of water to produce the electric potential changes.

Low frequency waveforms are emitted through two coiled wires attached to the outside of the water pipe. As a result of these waveforms, the two coils are constantly inducing a voltage into the water in the area of the ClearWave™. When one coil induces a positive voltage the other coil induces a counteracting negative voltage. This electric field causes the calcium or magnesium to remain in solution or suspension and the treated water continues to dissolve scale as it flows downstream. Over time, the ClearWave™ treated water helps solve hard water problems in the entire system, including pipes, water heaters, showerheads, and appliances. The ClearWave™ is the state-of-the-art in electronic water conditioning. The ClearWave™ microprocessor-controlled technology continually varies its frequency, affecting the widest range of mineral concentrations and other variables that cause “hard water” problems.

The length of time required to alter the characteristics of the lime scale is dependent on the mineral makeup of the water being treated. The mineral makeup of the water can impact the operation of the ClearWave™’s electrical field. A high concentration of iron (soluble and insoluble) causes a disruption and weakening of the electrical field, reducing the effectiveness on scale reduction. Under these conditions an iron removal system is required to filter out the iron prior to the ClearWave™. Additionally, if the water is excessively hard (greater than 25 grains), the ClearWave™ is often less effective.

## **TESTING FOR HARDNESS AND IRON LEVELS**

### *High Iron Concentration*

A high concentration of iron (soluble and insoluble) causes a disruption and weakening of the ClearWave™’s electrical field, reducing its effectiveness on scale reduction. Under these conditions an iron removal system is required to filter out the iron prior to the ClearWave™. We recommend an iron removal system for total iron levels above 0.3 ppm (parts per million). Contact your local health department or water authorities for testing your water

### *Water Hardness*

On hardness levels above 250 ppm or 15 gpg, two ClearWave™ units should be mounted in series on the incoming water pipe. The maximum hardness level the ClearWave™ will effectively work on is 425 ppm or 25 gpg. Above these levels, the ClearWave™ should be used in conjunction with a tradition ion exchange water softener to remove hardness and condition the water. This allows you to minimize the salt used to remove the hardness and maintain the cost saving benefits of the ClearWave™ water-conditioning system.

## INSTALLATION

### WHERE TO INSTALL THE CLEARWAVE™

1. For water supply applications, locate where the main water supply pipe enters the home or building. Point of use applications such as dishwashers, ice makers, boilers, water heaters etc., attach the ClearWave™ unit to the water supply line to that particular appliance. For long system piping lengths or high level calcium water, mount a CW-HD-1 to point of use appliances.
2. Find a suitable location to install the ClearWave™ on the water supply pipe before the piping branches off to supply water throughout the building.

### HOW TO INSTALL THE CLEARWAVE™

1. One set of mounting brackets are provided, for mounting the ClearWave™ onto 1-1/2 inch to 4 inch water pipes or wall mounted near the selected pipe area. Mount the mounting brackets to the base of the ClearWave™ by using the screws provided. Mount the ClearWave™ onto the pipe with wire ties or to the wall with appropriate fasteners. (see Figure 1) For pipe mounting, the wall mount tabs should be removed from the mounting brackets. (see Figure 2)
2. Plug the antennas into each end of the housing, to the appropriate wire wrap connections (e.g. "CW" for clockwise wrapping and "CCW" for counter clockwise wrapping). If longer wires are needed, up to 50 feet of 12Ga stranded wire can be added to the antenna wires with an insulated butt end wire connector or they can be replaced with 60 feet of 12Ga stranded wire.

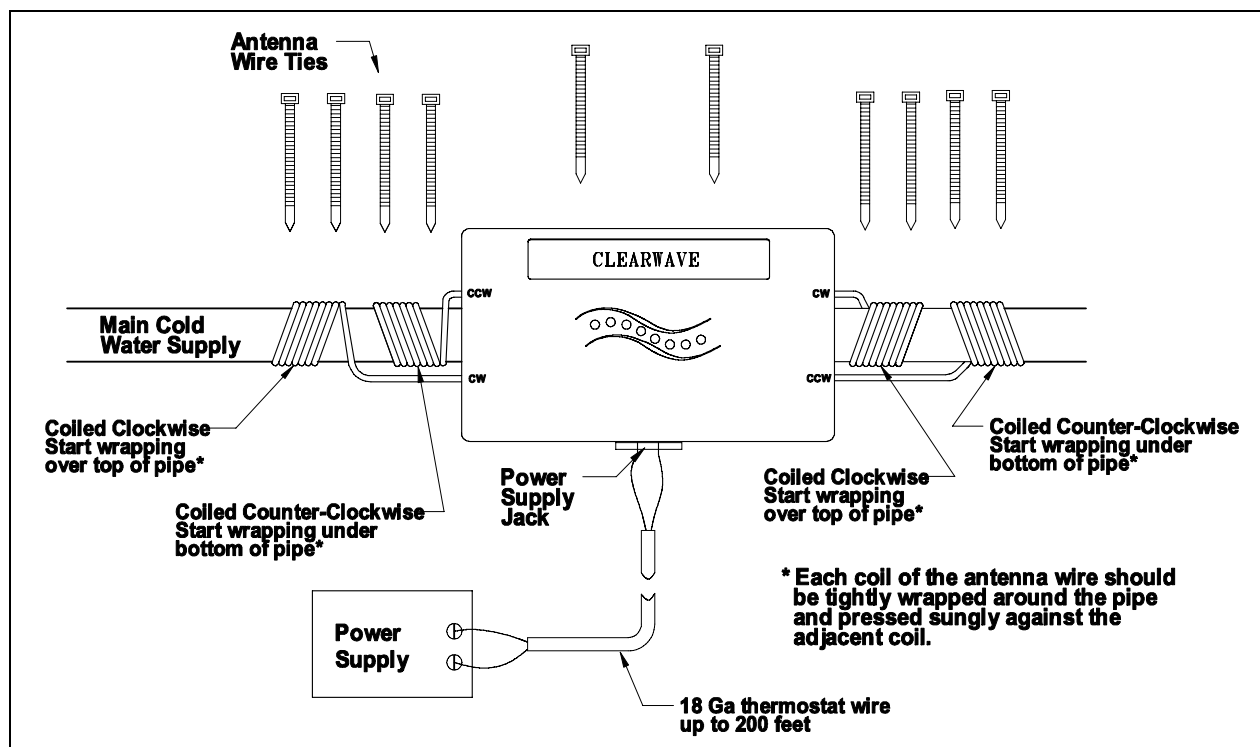


Figure 1

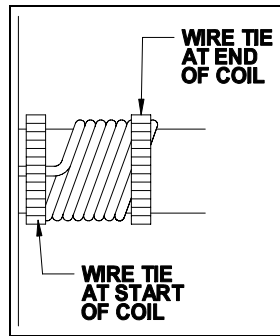


Figure 1A

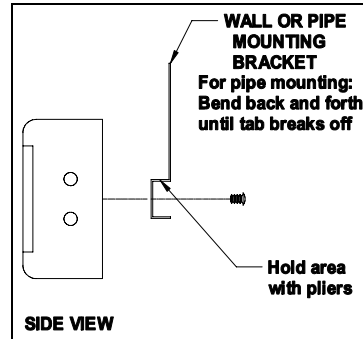


Figure 2

## PROPERLY WRAPPING THE ANTENNAE

The antenna wrap around the water pipe on each end of the ClearWave™ (see Figure 1). A minimum of seven fully wrapped coils of the antenna wire, with each coil wrapped tightly against the pipe and pressed snugly against each other is required for best results (see Figure 1A). Each wire coil should be spaced 1 inch to 2 inches apart. The operation of the ClearWave™ and the antenna installation is not based on direction of water flow, but one antenna MUST be wrapped in a clockwise direction and the other wrapped in an counter-clockwise direction.

1. On the right side of the unit wrap the first antenna onto the water pipe by securing the “CW” clockwise antenna to the water pipe next to the ClearWave™ housing with a wire tie. Wrap the right antenna clockwise (over the top of the pipe first), keeping the antenna wire tight against the pipe and the preceding coil. Secure the end of the antenna wire to the water pipe with a wire tie (see Figure 1A). Repeat wrapping the remainder of the antennas onto the pipe alternating the wrap direction (see Figure 1).
2. On left side of the unit wrap the first antenna onto the water pipe by securing the “CCW anti clockwise antenna to the water pipe next to the ClearWave™ housing with a wire tie. Wrap the antenna counter-clockwise (Under the bottom of the pipe first), keeping the antenna wire tight against the pipe and the preceding coil. Secure the end of the antenna wire to the water pipe with a wire tie. Repeat wrapping the remainder of the antennas onto the pipe alternating the wrap direction (see Figure 1).
3. When energized, the ClearWave™ by plugging in the power supply, the modulation indicator lights start flashing sequentially indicating that the ClearWave™ is functioning properly. If the indicator lights do not flash sequentially, unplug the power supply, wait one minute then plug in the power supply again. If at any time a functional problem is suspected, unplug the power supply, wait one minute then plug in the power supply again.

**NOTE:** The performance of the ClearWave™ is not affected by the direction or orientation of the unit. The unit may be mounted to horizontal, vertical, or diagonally. The ClearWave™ can be used effectively on any type of water pipe; galvanized, copper, or plastic.

**NOTE:** The ClearWave™ is designed and tested to cause little or no interference to other communication devices, such as televisions, and most cordless telephones. Install the ClearWave™ at least ten feet from any radio, television, or cordless telephone base unit to eliminate possible interference.

## MAXIMUM WATER CONDITIONING CAPACITY FOR NOMINAL PIPE DIAMETERS

Nominal Pipe Diameter	1 inch	2 inch	3 inch	4 inch
# of Units Req.	1	1	1	2
GPM Flow	69	118	219	450

## **OPERATION TIMETABLE FOR THE CLEARWAVE™**

The following timetable of events should be used to evaluate the operation of the ClearWave™ during the 180-day customer satisfaction period. This is the best way to evaluate the ClearWave™ operation and benefits the ClearWave™ technology can provide for you and your home. Please note testing for changes in hardness with current testing practices will not show you if the ClearWave™ is working. The current practice of determining water hardness is the measurement of the concentration of calcium and magnesium in the water. Since the ClearWave™ does not remove any calcium or magnesium ions from the water, testing the water before and after the installation of the ClearWave™ will not show any change.

*DAY 1:*.....The ClearWave™ action immediately starts to loosen existing scale in both the hot and cold water systems. One should find soap lathers more easily.

*DAY 5 and onwards:*.....Scale begins to break down and come off water heater elements (immersion heaters) and tanks. Most particles are microscopic and will flow through your water system, but some small particles may be seen in the water coming from the hot water tap.

*DAY 10 to 16:*.....It should be noticeably easier to wipe clean ceramic, plastic, glass, and metal surfaces. By now the quantity of bath soap, dish soap, laundry detergent, and laundry softening agents can be reduced. Scale should have loosened on faucet, showerheads and frequently used appliances that boil water (such as coffee makers).

*DAY 16 and onwards:*.....Scale should continue to loosen from faucet, showerheads, and pipes. With the continuing break down and reduction of scale from the heating surfaces of water heaters, water should heat up quicker using less energy to achieve the desired temperature.

*After 1 to 2 months:*.....Any scaly crust or stains in toilets or under faucet should be significantly reduced. No new stains or crust should form. Mold that attaches to scale will begin to disappear from shower curtains and once cleaned should not reappear. Depending on the water hardness in the area, the full affects can take up to 12 weeks, especially if the system has been heavily scaled up over many years.

### **NOTES:**

- 1) If iron is present in the water supply, use an iron filter prior to the ClearWave™.
- 2) Depending on water hardness or water make-up, two CW-HD-2 units may be required.
- 3) The CW-HD-2 can be used on water up to 25 grains of hardness. If over 25 grains, it can be used to aid the operation of a water softener.

### **MANUFACTURERS' WARRANTY:**

The ClearWave™ unit is guaranteed for 18 months from the date of the original purchase against defects in workmanship and material. During that period these defects will be repaired or the unit will be replaced without charge at manufacturers option. \*This guarantee covers normal consumer usage but excludes damage caused by alteration, accident, misuse, abuse, neglect, installation, or normal wear and tear. Should your unit fail within the unit guarantee period, please pack it carefully in the original box and return it to your supplier. This guarantee does not affect your statutory rights. Please return the guarantee at the end of this manual, to register your purchase.

### **SATISFACTION GUARANTEED:**

In the unlikely event you are not satisfied with the performance of the ClearWave™ Water Conditioner it should be returned with the receipt to the point of purchase (complete), and within 180 days of the original purchase date. It should be packed in the original, box and is subject to the: \* Terms and Conditions of the manufacturers' warranty.

**For more information on the ClearWave™, visit the Field Controls web site at [www.fieldcontrols.com](http://www.fieldcontrols.com).**

## ClearWave™ Warranty Registration

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone#: \_\_\_\_\_ Fax# \_\_\_\_\_

1. Grains if Known.			
2. ppm's if Known.			
3. Do you have iron present in your water?	YES NO	If Yes, circle one	Light Moderate Heavy Very Heavy
4. Had you installed an Iron filter prior to purchasing the ClearWave™?	YES NO	ppm's if Known	
5. Where did you purchase the ClearWave™ from?			
6. Date purchased.			
7. Mfg. date code.			

Hardness Level Check One	<input checked="" type="checkbox"/>
<i>Light:</i> 1-3 grains 17-51 ppm	
<i>Moderate:</i> 4-6 grains 52-102 ppm	
<i>Hard:</i> 7-10 grains 103-170 ppm	
<i>Very Hard:</i> 10 grains & above 170 ppm & above	

Briefly describe any current water problems; scale build up, odor, taste, staining, etc... \_\_\_\_\_

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(ppm-Parts Per Million)

